

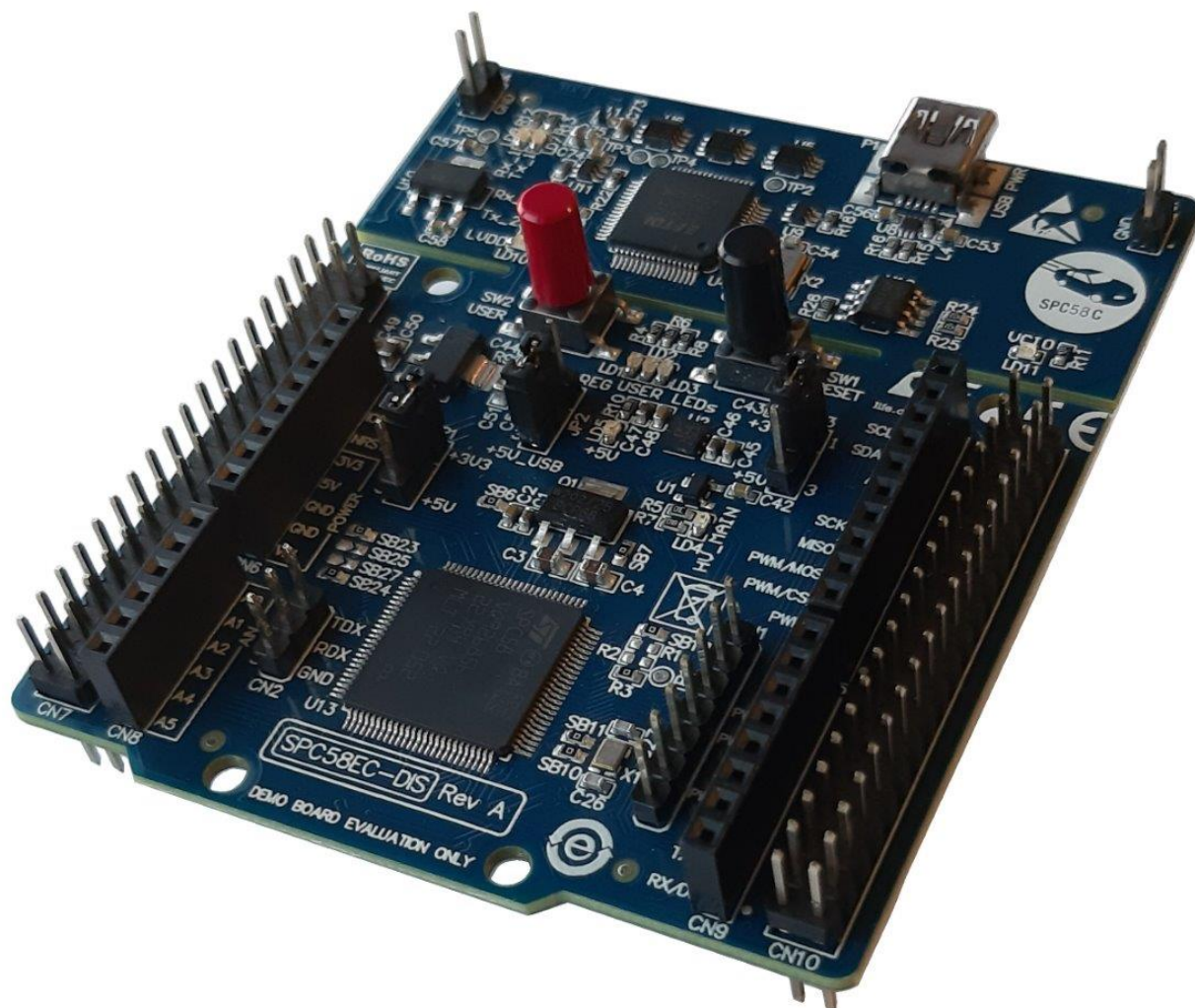
## SPC58EC-DIS discovery board

### Introduction

The SPC58EC-DIS is a low-cost development board to evaluate and develop applications with the microcontroller SPC58EC80E3 in the eTQFP 100-pin package.

This document describes the hardware architecture of the SPC58EC-DIS discovery board and in which way the jumpers can be set to enable specific functions.

Figure 1. SPC58EC-DIS



Note: Picture not contractual.

## 1 Overview

The SPC58EC-DIS discovery board is an evaluation tool supporting STMicroelectronics SPC58EC80E3, a high performance e200z420n3 dual core 32-bit power architecture technology CPU 180 MHz, 1088 KB 4224 KB (4096 KB code flash memory + 128 KB data flash memory) 384 KB SRAM in an eTQFP100 package.

The SPC58EC-DIS allows full access to peripherals such as DSPI, LINFlexD, ISO CAN-FD. The new features satisfy the ASIL-B requirements.

The board integrates a programmer/debugger that allows debugging and programming the microcontroller via USB cable. In addition, it allows enabling a UART communication channel (USB virtual COM port).

Dedicated connectors allow plugging shields Arduino UNO-compatible; this feature makes it easy to expand the functionality of the SPC58EC-DIS.

All CPUs pins are connected to two-pin arrays. This solution simplifies the debug activity as well as it reduces the effort to connect the SPC58EC-DIS to the final user application board.

A 1x7 JTAG header connector is available to program and debug the microcontroller by using an external tool.

**Figure 2. SPC58EC-DIS top view**

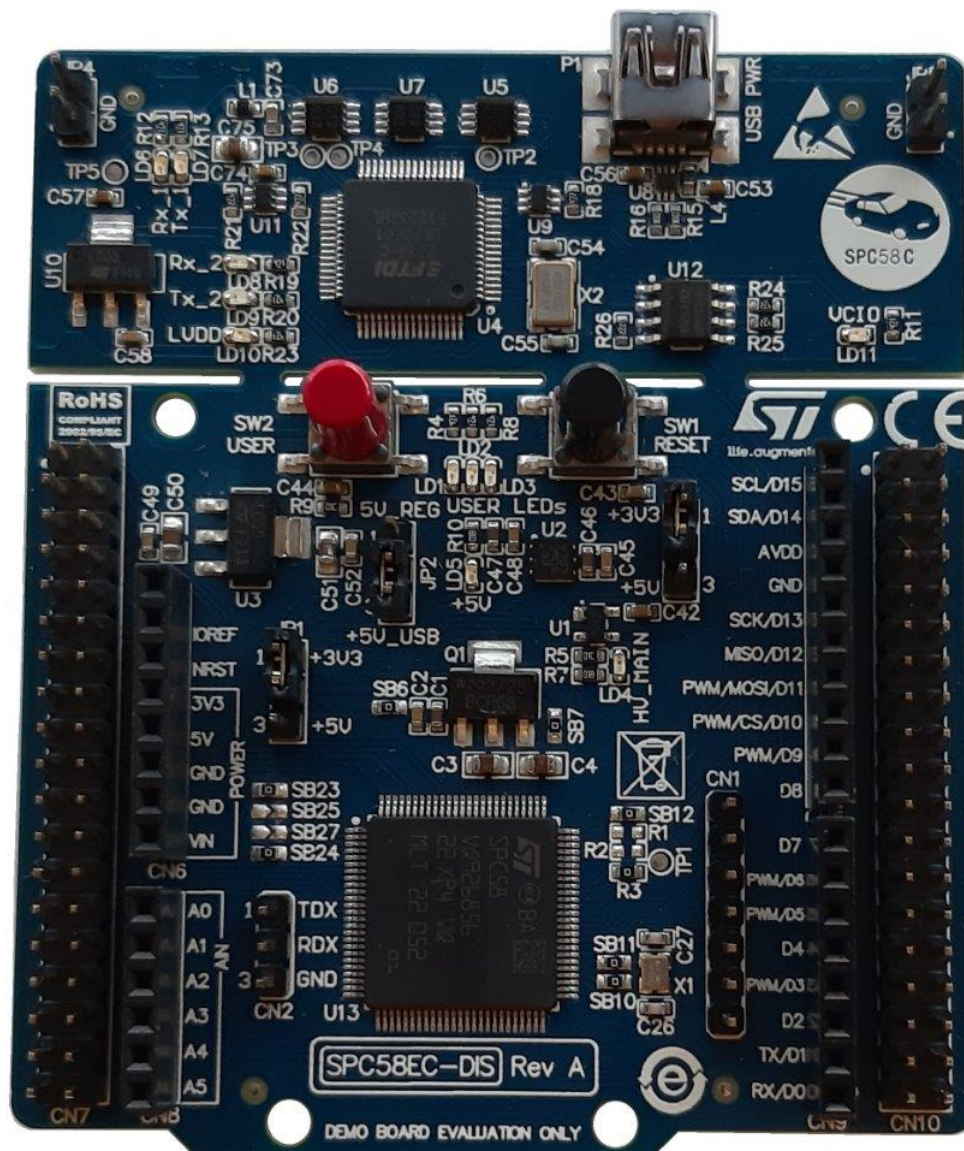
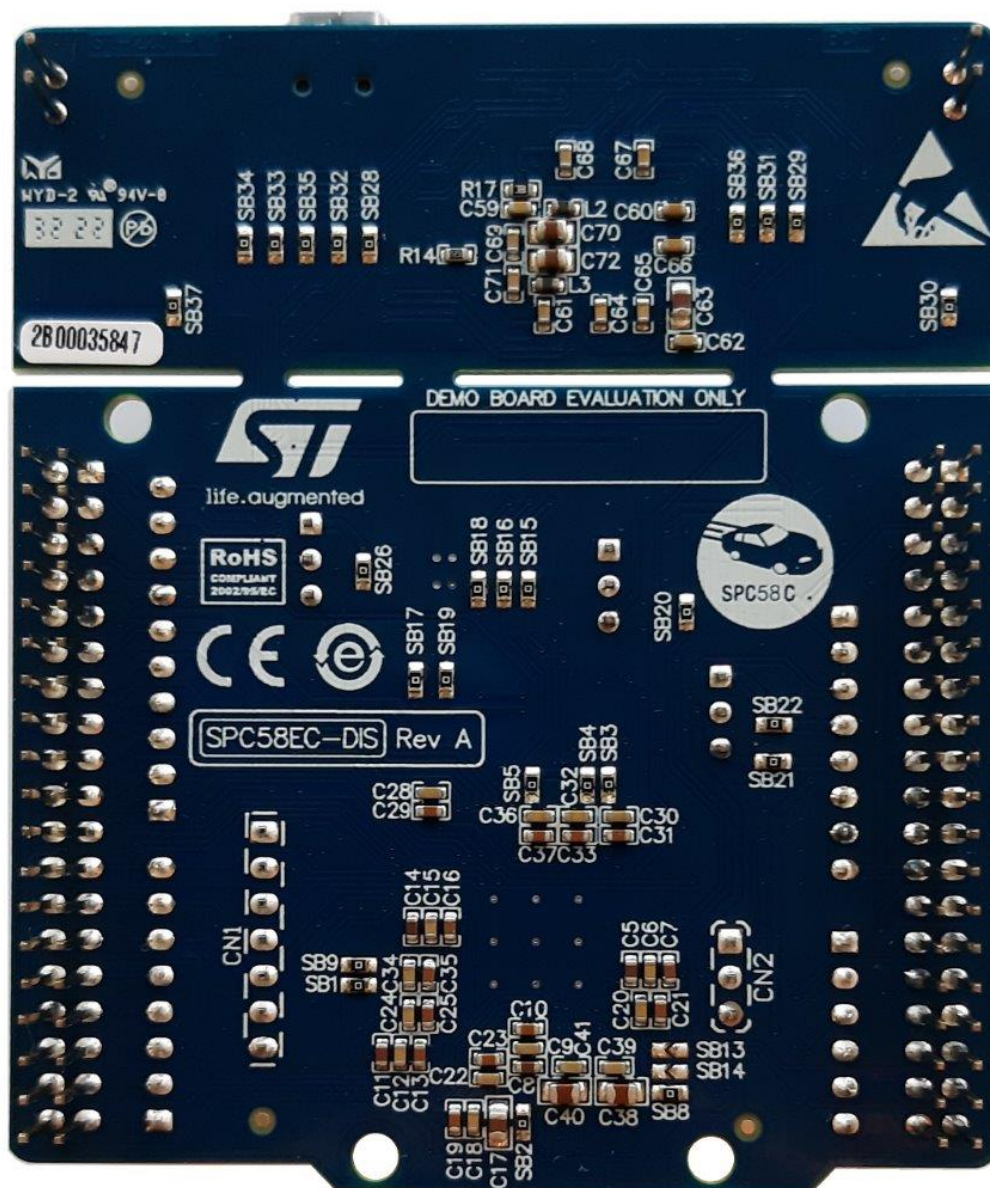


Figure 3. SPC58EC-DIS bottom view



## 2 License agreement

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The packaging of this evaluation board was sealed with a seal stating, by breaking this seal, you agree to the terms and conditions of the evaluation board license agreement, the terms and conditions of which are available at [https://www.st.com/resource/en/evaluation\\_board\\_terms\\_of\\_use/evaluationproductlicenseagreement.pdf](https://www.st.com/resource/en/evaluation_board_terms_of_use/evaluationproductlicenseagreement.pdf).

Upon breaking the seal, you and STMicroelectronics entered into the evaluation board license agreement, a copy of which is also enclosed with the evaluation board for convenience.

**Attention:** *This evaluation board only offers limited features for evaluating ST products. It has not been tested for use with other products and is not suitable for any safety or other commercial or consumer application. This evaluation board is otherwise provided "AS IS" and STMicroelectronics disclaims all warranties, express or implied, including the implied warranties of merchantability and fitness for a particular purpose.*

### **3 Handling precautions**

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Please take care to handle the package content in order to prevent electrostatic discharge.

Before the EVB is used or the power is applied, please fully read the following sections on how to correctly configure the board. Failure to correctly configure the board may cause irreparable component, MCU or EVB damage.

## 4 Hardware description

### 4.1 Power supply section

The SPC58EC-DIS can be supplied by using some DC sources, setting some jumpers properly:

- by the host PC through the USB cable (5 V; this is the default configuration)
- by an external source connected to the VIN pin (CN6 pin 8, CN7 pin 24) (7÷12V). The maximum input voltage level is limited by the thermal dissipation of the linear regulators. The input voltage level must be selected and limited according to the microcontroller current absorption
- by an external source connected to E5V (CN6 pin 5, CN7 pin 17 and CN10 pin 8)
- by an external source connected both to E3V3 (CN6 pin 4 and CN7 pin 16) and to E5V (CN6 pin 5 and CN7 pin 18)

The external source can be a PSU, or the user application. The external sources or the PSUs connected to the board must be SELV (safety extra-low voltage) compliant, self-protected and with limited current capability.

#### 4.1.1 Jumpers configuration cable

**Table 1. Power source and jumpers configuration**

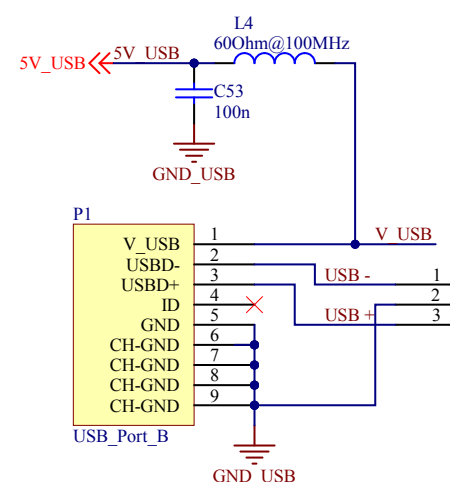
|                                | Jumper configuration |           |        |       |       |
|--------------------------------|----------------------|-----------|--------|-------|-------|
| Power source                   | 5 V USB              | 5V Reg    | +3.3 V | E5V   | E3V3  |
| Jumper                         | JP2 (2-3)            | JP2 (1-2) | SB26   | SB21  | SB22  |
| PCB - USB Cable                | Close                | Open      | Close  | Close | Close |
| External source - VIN          | Open                 | Close     | Close  | Close | Close |
| External source - E5V          | Open                 | Open      | Close  | Close | Close |
| External source - E3V3 and E5V | Open                 | Open      | Open   | Close | Close |

#### 4.1.2 Voltage regulators and jumpers

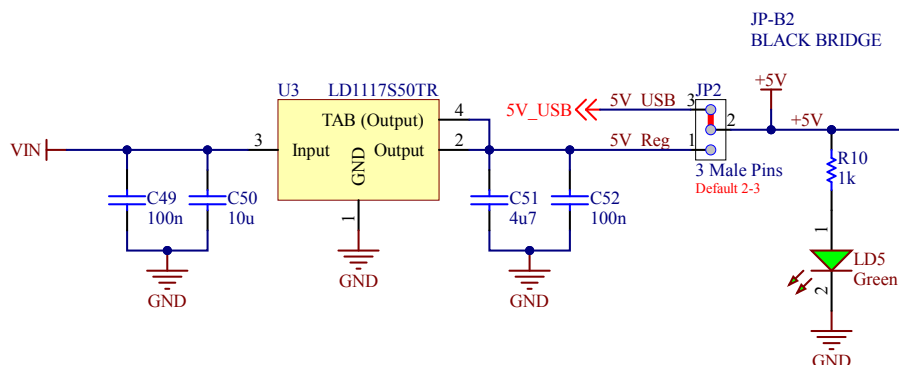
This paragraph describes the power supply section and how to configure the jumpers.

The LED LD5 monitors the 5 V supply. U2 and U3 are linear regulators; the output voltage are 3.3 V and 5 V respectively.

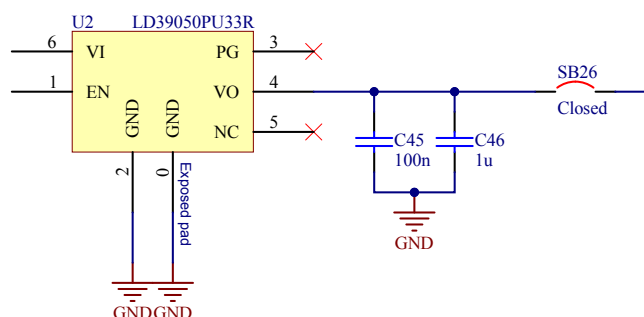
**Figure 4. USB Port - 5 V input**



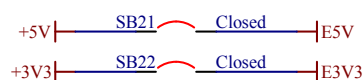
**Figure 5. 5 V regulator (external PSU) and 5 V selector (JP2)**



**Figure 6. 3.3 V voltage regulator and 3.3 V selector (SB26)**



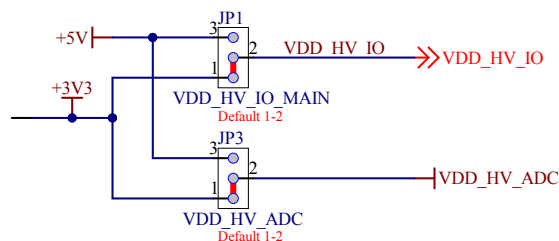
### Figure 7. E3V3 and E5V jumpers



## 4.2 Microcontroller power management

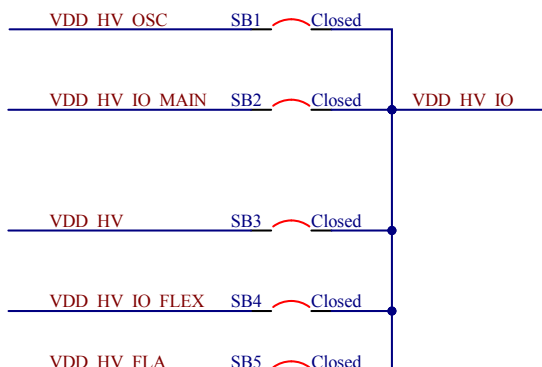
The jumper JP1 sets the supply voltage level of the VDD\_HV\_IO power domain and JP3 sets the supply voltage level of the VDD\_HV\_ADC power domain.

**Figure 8. Microcontroller power management - jumpers setting**



The [Figure 9](#) shows the solder bridges used to connect all high voltage power domains to the VDD\_HV\_IO power supply source.

**Figure 9. Microcontroller high voltage configuration jumpers**



The following table lists all power domains configuration jumpers.

**Table 2. Power domains jumper configuration**

| Jumpers | Description                                                                                                                                                                    | Default value  | Position                         |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------|
| JP1     | VDD_HV_IO configuration jumper <ul style="list-style-type: none"> <li>1-2: VDD_HV_IO connected to 3.3 V</li> <li>2-3: VDD_HV_IO connected to 5 V</li> </ul>                    | 1-2<br>(3.3 V) | Top layer – B3 <sup>(1)</sup>    |
| JP3     | VDD_HV_ADC configuration jumper <ul style="list-style-type: none"> <li>1-2: VDD_HV_ADC connected to 3.3 V</li> <li>2-3: VDD_HV_ADC connected to 5 V</li> </ul>                 | 1-2<br>(3.3 V) | Top layer – C2 <sup>(1)</sup>    |
| SB1     | VDD_HV_OSC configuration jumper: <ul style="list-style-type: none"> <li>Open: VDD_HV_OSC connected to VDD_HV_IO</li> <li>Closed: VDD_HV_OSC unconnected</li> </ul>             | Closed         | Bottom layer - B4 <sup>(2)</sup> |
| SB2     | VDD_HV_IO_MAIN configuration jumper: <ul style="list-style-type: none"> <li>Open: VDD_HV_IO_MAIN connected to VDD_HV_IO</li> <li>Closed: VDD_HV_IO_MAIN unconnected</li> </ul> | Closed         | Bottom layer – C4 <sup>(2)</sup> |
| SB3     | VDD_HV configuration jumper: <ul style="list-style-type: none"> <li>Open: VDD_HV connected to VDD_HV_IO</li> <li>Closed: VDD_HV unconnected</li> </ul>                         | Closed         | Bottom layer – C3 <sup>(2)</sup> |
| SB4     | VDD_HV_IO_FLEX configuration jumper: <ul style="list-style-type: none"> <li>Open: VDD_HV_IO_FLEX connected to VDD_HV_IO</li> <li>Closed: VDD_HV_IO_FLEX unconnected</li> </ul> | Closed         | Bottom layer – C3 <sup>(2)</sup> |
| SB5     | VDD_HV_IO_FL A configuration jumper: <ul style="list-style-type: none"> <li>Open: VDD_HV_IO_FL A connected to VDD_HV_IO</li> <li>Closed: VDD_HV_IO_FL A unconnected</li> </ul> | Closed         | Bottom layer – C3 <sup>(2)</sup> |

1. Refer to the Figure 18. SPC58EC-DIS top layer.

2. Refer to the Figure 19. SPC58EC-DIS bottom layer.

### 4.3 Integrated programmer/debugger

The integrated programmer/debugger allows the user to program the microcontroller and debug the software applications.

The debugger serial number is reported on the label applied on the board (bottom side).

The integrated debugger SW is accessible via ST's free integrated development environment, SPC5-STUDIO ([www.st.com/spc5studio](http://www.st.com/spc5studio)). To download the debugger software and to activate a license refer to the PLS website.

A JTAG port allows connecting further HW/SW tools to program and debug the microcontroller(s). U106 can be configured to establish a serial communication port; pin 38(Tx), pin 39 (Rx) and two level-shifters implement this feature.

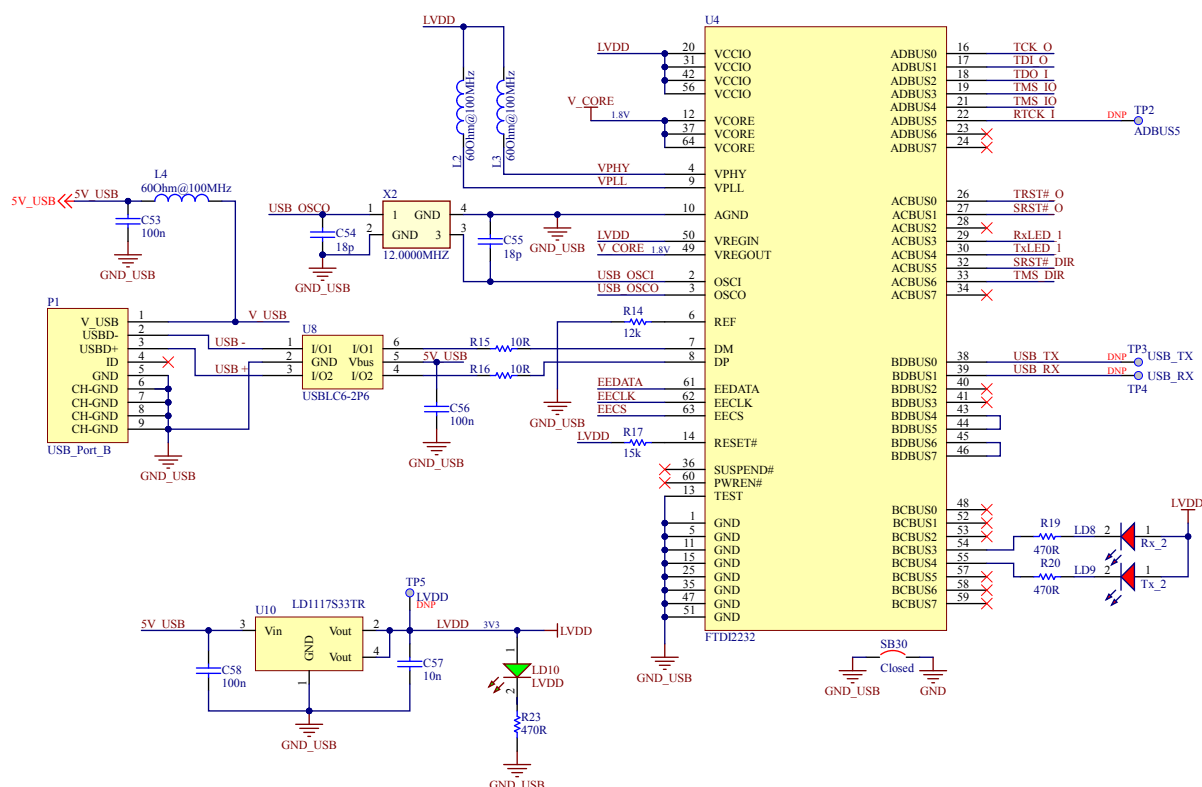
The following table shows the jumpers configuration.

### Table 3. JTAG jumpers configuration

[illegible]

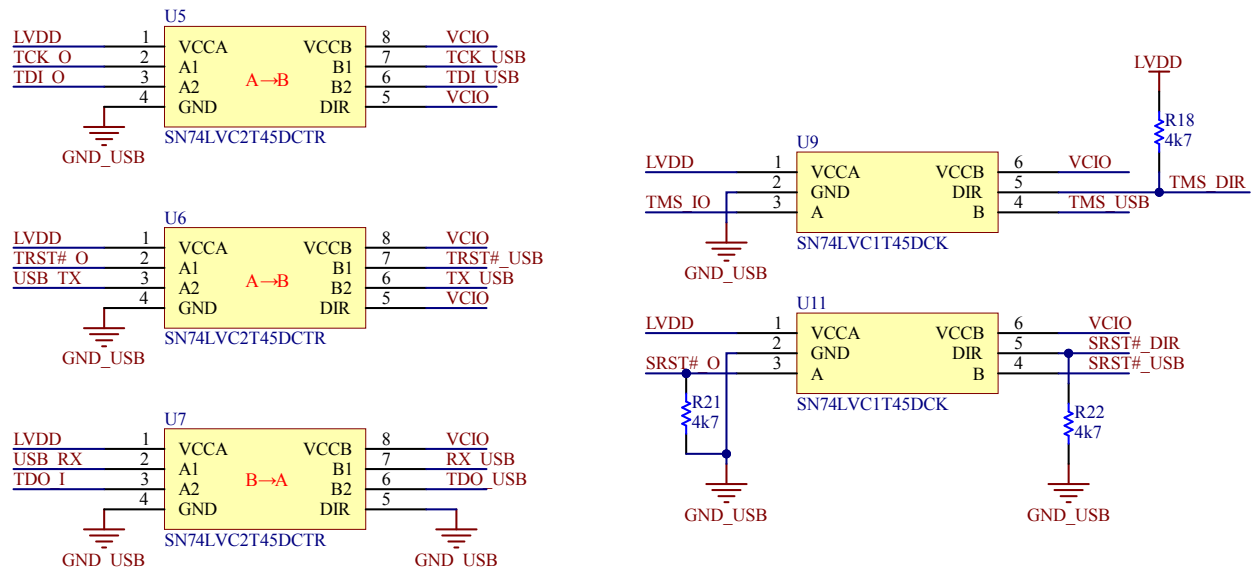
The following figure shows the PLS integrated programmer/debugger circuitry.

**Figure 10. PLS integrated programmer/debugger**



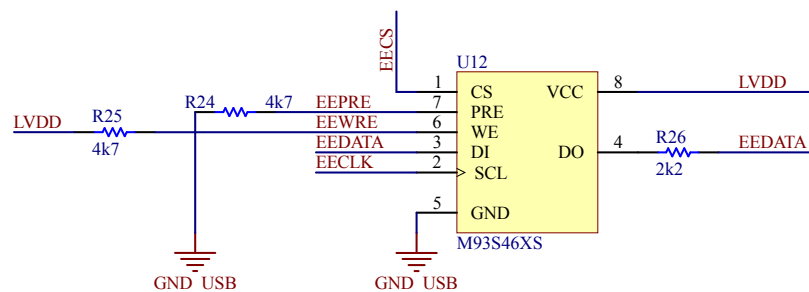
The following figure shows the level shifters of the PLS integrated programmer/debugger circuitry.

**Figure 11. Level shifters of the PLS integrated programmer/debugger**

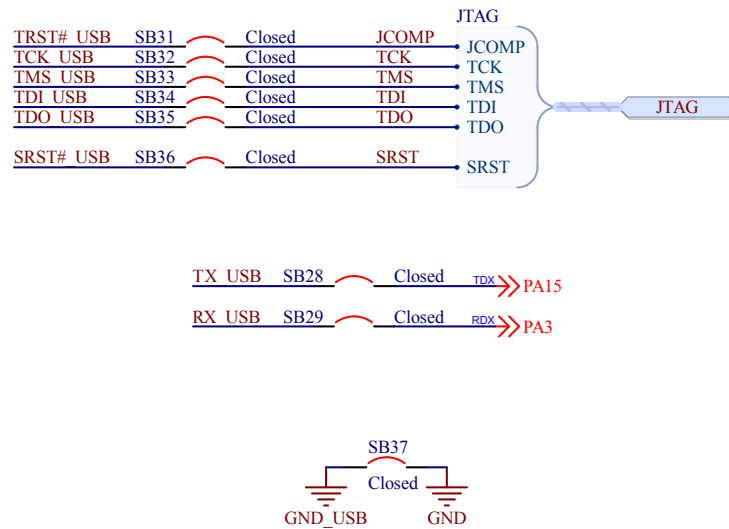


The following figure shows the EEPROM of the PLS integrated programmer/debugger circuitry.

**Figure 12. EEPROM of the PLS integrated programmer/debugger**



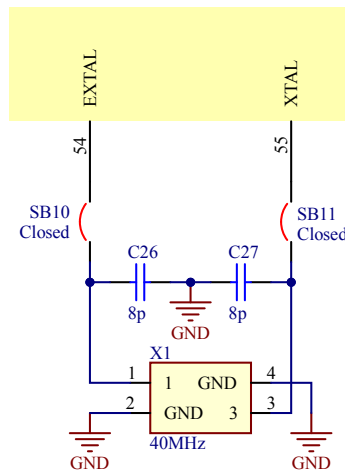
The Figure 13 shows the jumpers configuration of PLS integrated programmer/debugger circuitry.

**Figure 13. Jumpers configuration of PLS integrated programmer/debugger**


#### 4.4

### Crystal oscillator

In the default hardware configuration, the microcontroller has a 40 MHz crystal oscillator (X1) connected. The following figure shows the crystal oscillator circuitry.

**Figure 14. Crystal oscillator circuitry**


The following table shows the jumpers used to configure the crystal oscillator.

**Table 4. Crystal oscillator - jumpers configuration**

| Jumper | Description                                                                                                                                                                | Default value | Position                      |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|
| SB10   | EXTAL jumper configuration: <ul style="list-style-type: none"> <li>Open: EXTAL not connected</li> <li>Closed: EXTAL connected to 40 MHz crystal oscillator (X1)</li> </ul> | Closed        | Top layer – C4 <sup>(1)</sup> |
| SB11   | XTAL jumper configuration: <ul style="list-style-type: none"> <li>Open: XTAL not connected</li> <li>Closed: XTAL connected to 40 MHz crystal oscillator (X1)</li> </ul>    | Closed        | Top layer – C4 <sup>(1)</sup> |

1. Refer to the Figure 18. SPC58EC-DIS top layer.

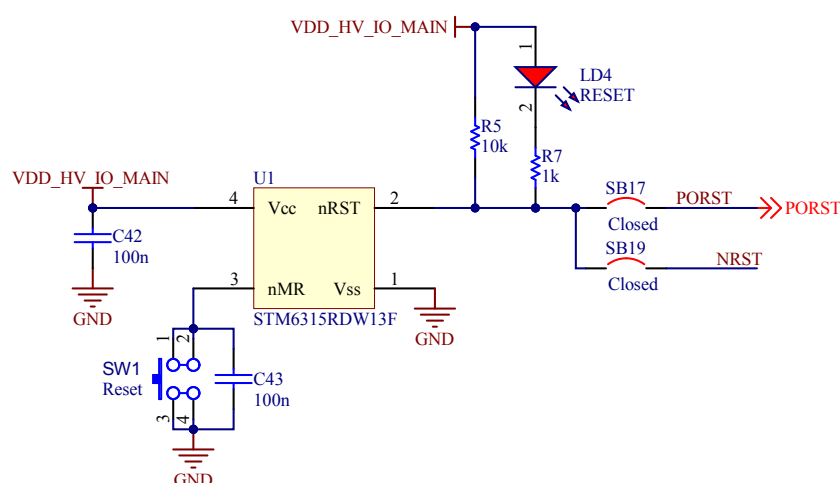
## 4.5 Reset circuit

The following figure shows the reset circuit; it generates a sharp signal to reset the microcontroller when the pushbutton SW1 is pushed.

SW1 triggers the STM6315RB-2.63V and it generates reset pulse (active low signal); LD4 is turned on when the reset pulse is generated. The solder jumper SB17 allows to disconnect PORST signal while the solder jumper SB19 allows to disconnect the NRST signal (in the default configuration it is closed).

The internal reset generator can be disabled, and the reset signal can be provided by an external source connected to CN6 pin3; to implement this configuration SB17 should be removed.

**Figure 15. Reset circuitry**



The following table shows the jumpers used to configure the reset.

**Table 5. Reset - jumpers configuration**

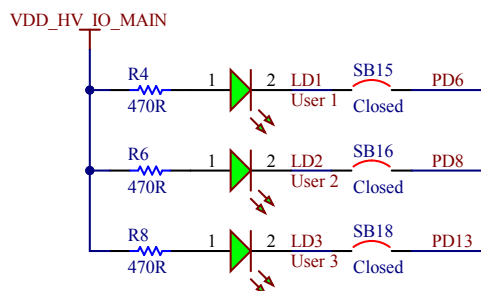
| Jumper | Description                                                                                                                                                         | Default value | Position                         |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------|
| SB17   | PORST jumper configuration: <ul style="list-style-type: none"> <li>Open: PORST not connected</li> <li>Closed: PORST connected to the device</li> </ul>              | Closed        | Bottom layer – B3 <sup>(1)</sup> |
| SB19   | NRST jumper configuration: <ul style="list-style-type: none"> <li>Open: NRST not connected</li> <li>Closed: NRST connected to the pin 3 of CN6 connector</li> </ul> | Closed        | Bottom layer – B3 <sup>(1)</sup> |

1. Refer to the [Figure 19. SPC58EC-DIS bottom layer](#).

## 4.6 User LEDs - user button

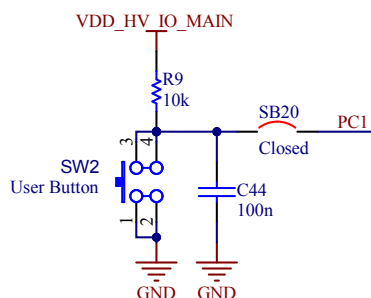
In the board three LEDs are available for user purposes. The solder jumpers SB15, SB16 and SB18 allow disconnecting the anode of each LED and then let the user reserve these pins for a different purpose. The following figure shows the user LEDs schema.

**Figure 16. User LEDs**



In the board a pushbutton is available for user purpose. The solder jumper SB20 allows disconnecting the pushbutton and let the user reserve this pin for a different purpose. The following figure shows the user pushbutton schema.

**Figure 17. User pushbutton**



The following table shows the pins used to configure the user LEDs and the user pushbutton.

**Table 6. Pins connected to user LEDs and user pushbutton**

| User LEDs and user pushbutton | Pin  | Position                      |
|-------------------------------|------|-------------------------------|
| LD1                           | PD6  | Top layer – B2 <sup>(1)</sup> |
| LD2                           | PD8  | Top layer – B2 <sup>(1)</sup> |
| LD3                           | PD13 | Top layer – B2 <sup>(1)</sup> |
| SW2                           | PC1  | Top layer – B2 <sup>(1)</sup> |

1. Refer to the [Figure 18. SPC58EC-DIS top layer](#).

## 4.7 Connectors

### 4.7.1 Arduino connectors

The following table lists all Arduino connectors available.

**Table 7. Arduino connectors**

| Connector | Description                         | Position                         |
|-----------|-------------------------------------|----------------------------------|
| CN5       | Arduino UNO-R3 digital PWM (D15+D8) | Top layer – D2 D3 <sup>(1)</sup> |
| CN6       | Arduino UNO-R3 power connector      | Top layer – A3 <sup>(1)</sup>    |
| CN8       | Arduino UNO-R3 analog input         | Top layer – A4 <sup>(1)</sup>    |
| CN9       | Arduino UNO-R3 digital PWM (D7+D0)  | Top layer – D3 D4 <sup>(1)</sup> |

1. Refer to the [Figure 18. SPC58EC-DIS top layer](#).

The following table shows the pinout of the Arduino UNO-R3 digital PWM (from D15 to D8) (CN5) connector.

**Table 8. Arduino UNO-R3 digital PWM (from D15 to D8) (CN5) pinout**

| CN5 pin | Arduino UnoR3 digital PWM (from D15 to D8) |                      | Function/signal |
|---------|--------------------------------------------|----------------------|-----------------|
| 1       | D8                                         | -                    | PA2             |
| 2       | D9                                         | PWM                  | PA1             |
| 3       | D10                                        | PWM/CS               | PA4             |
| 4       | D11                                        | PWM/MOSI             | PF13            |
| 5       | D12                                        | MSO                  | PD7             |
| 6       | D13                                        | SCK (LED)            | PD6             |
| 7       | GND                                        | GND                  | GND             |
| 8       | AVDD                                       | AVDD                 | VDD_HV_ADC      |
| 9       | D14                                        | I <sup>2</sup> C SDA | PM6             |
| 10      | D15                                        | I <sup>2</sup> C SCL | PM4             |

The following table shows the pinout of the Arduino UNO-R3 (CN6) connector.

**Table 9. Arduino UNO-R3 Power connector pinout**

| Arduino UnoR3 Power | CN6 pin | Function/signal |
|---------------------|---------|-----------------|
| Not connected       | 1       | Not connected   |
| IOREF (3V3)         | 2       | VDD_HV_IO_MAIN  |
| NRST                | 3       | NRST            |
| 3V3                 | 4       | E3V3            |
| 5 V                 | 5       | E5V             |
| GND                 | 6       | GND             |
| GND                 | 7       | GND             |
| VIN                 | 8       | VIN             |

The [Table 10](#) shows the pinout of the Arduino UNO-R3 analog input (CN8) pinout connector.

**Table 10. Arduino UNO-R3 analog input (CN8) pinout**

| CN8 pin | Arduino UNO-R3 analog input |     | Function/signal |
|---------|-----------------------------|-----|-----------------|
| 1       | A0                          |     | PG[12]          |
| 2       | A1                          |     | PG[11]          |
| 3       | A2                          |     | PD[10]          |
| 4       | A3                          |     | PB[10]          |
| 5       | A4                          | SDA | PB[9]           |
| 6       | A5                          | SCL | PB[8]           |

The following table shows the pinout of the Arduino UNO-R3 digital PWM (from D7 to D0) (CN9) connector.

**Table 11. Arduino UNO-R3 digital PWM (from D7 to D0) (CN9) pinout**

| CN9 pin | Arduino UnoR3 digital PWM (from D15 to D8) |     | Function/signal |
|---------|--------------------------------------------|-----|-----------------|
| 1       | D0                                         | -   | PA15            |
| 2       | D1                                         | -   | PA3             |
| 3       | D2                                         | -   | PD5             |
| 4       | D3                                         | PWM | PD4             |
| 5       | D4                                         | -   | PE9             |
| 6       | D5                                         | PWM | PE6             |
| 7       | D6                                         | PWM | PE5             |
| 8       | D7                                         | -   | PE7             |

#### 4.7.2 Extended connectors (I/O headers)

The following table lists all extended connectors available.

**Table 12. Extended connectors**

| Connector | Description                      | Position                            |
|-----------|----------------------------------|-------------------------------------|
| CN7       | Extended connector (I/O headers) | Top layer – A2 A3 A4 <sup>(1)</sup> |
| CN10      | Extended connector (I/O headers) | Top layer – D2 D3 D4 <sup>(1)</sup> |

1. Refer to the [Figure 18. SPC58EC-DIS top layer](#).

The following table shows the pinout of the extended connector (CN7).

**Table 13. Extended connector (CN7) connector pinout**

| Extended connector (CN7) | uC Port        |
|--------------------------|----------------|
| 1                        | PC[10]         |
| 2                        | PC[11]         |
| 3                        | PE[12]         |
| 4                        | PF[2]          |
| 5                        | VDD_HV_IO_MAIN |
| 6                        | E5V            |
| 7                        | PD[15]         |
| 8                        | GND            |

| Extended connector (CN7) | uC Port        |
|--------------------------|----------------|
| 9                        | Not connected  |
| 10                       | Not connected  |
| 11                       | Not connected  |
| 12                       | VDD_HV_IO_MAIN |
| 13                       | PD14           |
| 14                       | NRST           |
| 15                       | PC[0]          |
| 16                       | 3V3            |
| 17                       | PE[0]          |
| 18                       | E5V            |
| 19                       | PC[7]          |
| 20                       | GND            |
| 21                       | PC[6]          |
| 22                       | GND            |
| 23                       | PC[5]          |
| 24                       | VIN            |
| 25                       | PC[4]          |
| 26                       | Not connected  |
| 27                       | PE[3]          |
| 28                       | PG[12]         |
| 29                       | PE[1]          |
| 30                       | PG[11]         |
| 31                       | PD[13]         |
| 32                       | PD[10]         |
| 33                       | VDD_HV_IO_MAIN |
| 34                       | PB[10]         |
| 35                       | PE[2]          |
| 36                       | PB[9]          |
| 37                       | PD[12]         |
| 38                       | PB[8]          |

The following table shows the pinout of the extended connector (CN10).

**Table 14. Extended connector (CN10) connector pinout**

| Extended connector (CN10) | uC Port |
|---------------------------|---------|
| 1                         | PA[12]  |
| 2                         | PA[13]  |
| 3                         | PM[4]   |
| 4                         | PE[10]  |
| 5                         | PM[6]   |
| 6                         | PE[11]  |

| Extended connector (CN10) | μC Port       |
|---------------------------|---------------|
| 7                         | VDD_HV_ADC    |
| 8                         | E5V           |
| 9                         | GND           |
| 10                        | Not connected |
| 11                        | PD[6]         |
| 12                        | PA[10]        |
| 13                        | PD[7]         |
| 14                        | PA[11]        |
| 15                        | PF[13]        |
| 16                        | PD[0]         |
| 17                        | PA[4]         |
| 18                        | PA[0]         |
| 19                        | PA[1]         |
| 20                        | GND           |
| 21                        | PA[2]         |
| 22                        | Not connected |
| 23                        | PE[7]         |
| 24                        | PB[11]        |
| 25                        | PE[5]         |
| 26                        | PB[2]         |
| 27                        | PE[6]         |
| 28                        | PB[3]         |
| 29                        | PE[9]         |
| 30                        | PB[1]         |
| 31                        | PD[4]         |
| 32                        | GND           |
| 33                        | PD[5]         |
| 34                        | PD[11]        |
| 35                        | PA[3]         |
| 36                        | Not connected |
| 37                        | PA[15]        |
| 38                        | Not connected |

### 4.7.3 UART connector

The following table shows the pinout of the UART connector (CN2).

**Table 15. UART connector pinout**

| CN2 pin | Function/signal          |      |
|---------|--------------------------|------|
| 1       | SB23 closed<br>SB25 open | PA3  |
|         | SB23 open<br>SB25 closed | PC9  |
| 2       | SB24 closed<br>SB27 open | PA15 |
|         | SB24 open<br>SB27 closed | PC8  |
| 3       | GND                      |      |

### 4.7.4 JTAG connector

The following table shows the pinout of the JTAG connector (CN1).

**Table 16. JTAG connector pinout**

| CN1 pin | Function/Signal |
|---------|-----------------|
| 1       | JCOMP           |
| 2       | TCK             |
| 3       | TMS             |
| 4       | TDI             |
| 5       | TDO             |
| 6       | SRST            |
| 7       | GND             |

## 5 Layout overview

Figure 18. SPC58EC-DIS top layer

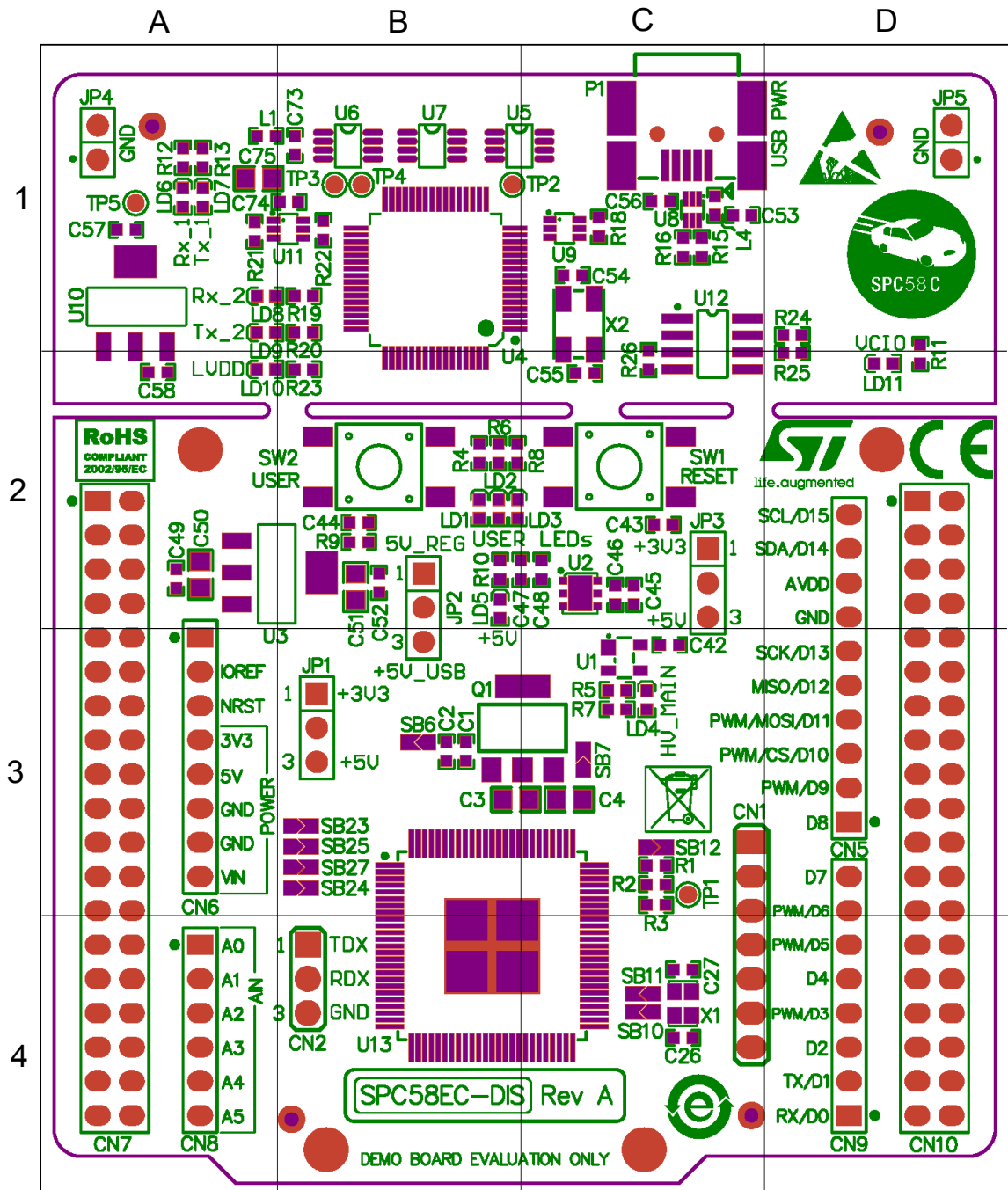
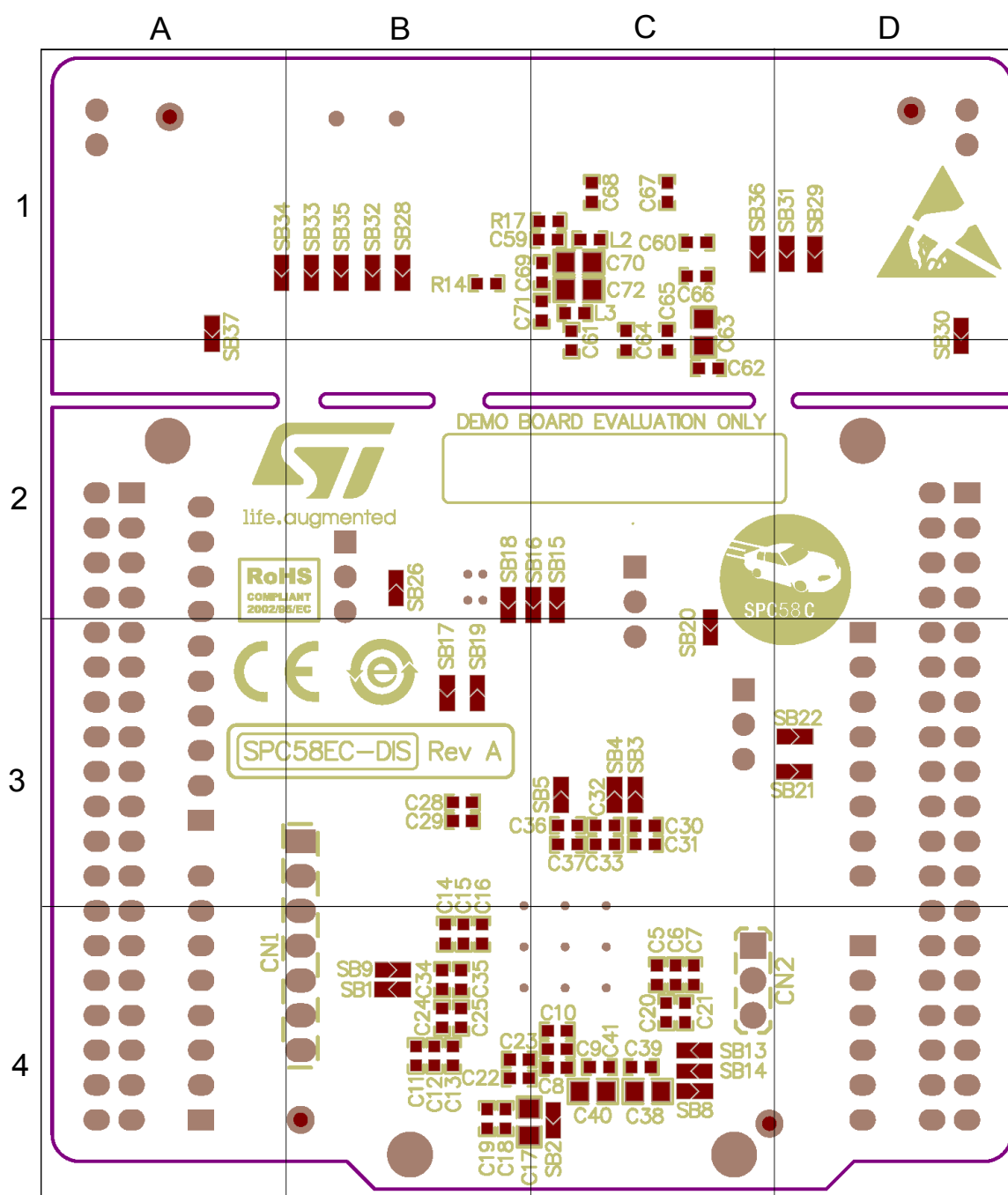


Figure 19. SPC58EC-DIS bottom layer



## 6 BOM

**Table 17. Bill of material**

| #  | Item                                                                                                                                                                                           | Qty | Value       | Description                                                                                                               | Footprint    |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------|---------------------------------------------------------------------------------------------------------------------------|--------------|
| 1  | C1, C5, C8, C11, C14, C46, C47                                                                                                                                                                 | 7   | 1 $\mu$ F   | C1608X7R1C105K080AC - SMD multilayer ceramic capacitor, 1 $\mu$ F, 16 V, 0603 [1608 metric], $\pm$ 10%, X7R, C series TDK | 0603C        |
| 2  | C2, C6, C9, C12, C15, C18, C20, C22, C24, C28, C30, C32, C34, C36, C39, C41, C42, C43, C44, C45, C48, C49, C52, C53, C56, C58, C59, C60, C61, C62, C64, C65, C66, C67, C68, C69, C71, C73, C74 | 39  | 100 nF      | 0603 100 nF 16 V $\pm$ 10% tolerance X7R surface mount multilayer ceramic capacitor                                       | 0603C        |
| 3  | C3, C4                                                                                                                                                                                         | 2   | 2.2 $\mu$ F | Ceramic capacitor 2.2 $\mu$ F 16 V X7R 10% SMD 0805 125C plastic T/R                                                      | 0805C        |
| 4  | C7, C10, C13, C16, C19, C21, C23, C25, C29, C31, C33, C35, C37, C57                                                                                                                            | 14  | 10 nF       | Ceramic capacitor 10000 pF 16 V X7R 0603                                                                                  | 0603C        |
| 5  | C17, C51, C63, C70, C72, C75                                                                                                                                                                   | 6   | 4.7 $\mu$ F | Ceramic capacitor 4.7 $\mu$ F 16 V X7R 0805                                                                               | 0805C        |
| 6  | C26, C27                                                                                                                                                                                       | 2   |             | Capacitor X7R                                                                                                             | 0603C        |
| 7  | C38, C40                                                                                                                                                                                       | 2   | 1.5 $\mu$ F | Ceramic capacitor 1.5 $\mu$ F 16 V X7R 20% SMD 0805 125 °C blister plastic T/R                                            | 0805C        |
| 8  | C50                                                                                                                                                                                            | 1   |             | Ceramic capacitor 10 $\mu$ F 16 Vdc X7R 10% SMD 0805                                                                      | 0805         |
| 9  | C54, C55                                                                                                                                                                                       | 2   | 18 pF       | C series 0603 18 pF 50 V $\pm$ 5 % tolerance C0G SMT multilayer ceramic capacitor                                         | 0603C        |
| 10 | CN1                                                                                                                                                                                            | 1   |             | 2.54mm pitch C-Grid III header, single row, vertical, 7 circuits, 0.76 $\mu$ m Gold (Au) selective plating                | STRIP-7-M-V  |
| 11 | CN2                                                                                                                                                                                            | 1   |             | Header connector, PCB mount, 3 contacts, pin, 0.1 pitch, pc tail terminal                                                 | STRIP-3-M-V  |
| 12 | CN5                                                                                                                                                                                            | 1   |             | Header, 10-pin, single row, female                                                                                        | 1*10P_FEMALE |
| 13 | CN6, CN9                                                                                                                                                                                       | 2   |             | Header, 8-pin, single row, female                                                                                         | 1*8P_FEMALE  |
| 14 | CN7, CN10                                                                                                                                                                                      | 2   |             | Header, 19-pin, dual row (6 + 2.5 + 10 mm)                                                                                | 2*19P        |
| 15 | CN8                                                                                                                                                                                            | 1   |             | Header, 6-pin, single row, female                                                                                         | 1*6P_FEMALE  |
| 16 | JP1, JP3                                                                                                                                                                                       | 2   | 3 male pins | MOLEX - 87891-0306 - board-to-board connector, 2.54 mm, 3 contacts, header, KK 254 87891 series, through hole, 1 row      | SIP3         |
| 17 | JP2                                                                                                                                                                                            | 1   | 3 male pins | 3x male pin - 0.1"                                                                                                        | SIP3         |
| 18 | JP4, JP5                                                                                                                                                                                       | 2   |             | Header, 2-pin, single row (6 + 2.5 + 10 mm)                                                                               | SIP2/2.54    |
| 19 | L1, L2, L3, L4                                                                                                                                                                                 | 4   |             | WE-CBF ferrite bead 0603 60 $\Omega$ 500 mA                                                                               | RES 0603     |
| 20 | LD1, LD2, LD3, LD5, LD6, LD7, LD10, LD11                                                                                                                                                       | 8   | Led green   | LED green                                                                                                                 | 0603D_G      |

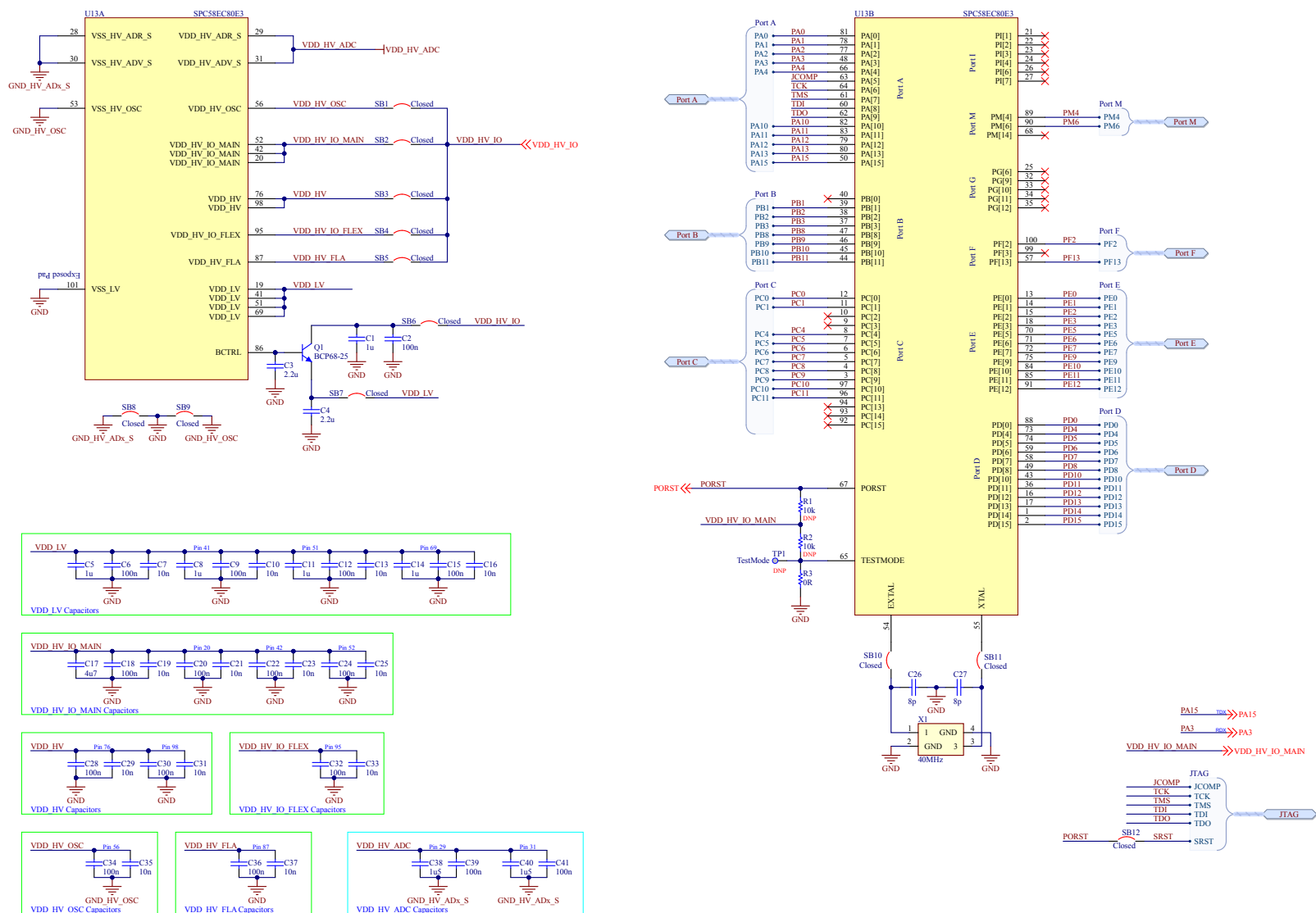
| #  | Item                                                                                                                                                                                                                                        | Qty | Value         | Description                                                                                    | Footprint                  |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------|------------------------------------------------------------------------------------------------|----------------------------|
| 21 | LD4, LD8, LD9                                                                                                                                                                                                                               | 3   | Led red       | LED uni-color red 625 nm 2-pin chip LED                                                        | 0603D_R                    |
| 22 | P1                                                                                                                                                                                                                                          | 1   |               | USB-MINI_B                                                                                     | CONN USB MINI B 67503-1020 |
| 23 | Q1                                                                                                                                                                                                                                          | 1   | BCP68-25      | SMD NPN transistor medium power                                                                | SOT223_BCE_T               |
| 24 | R1, R2                                                                                                                                                                                                                                      | 2   |               | Resistor thick film 0603 10 kΩ 1% 1/10W<br>±100 ppm/C molded SMD punched carrier T/R           | RES 0603                   |
| 25 | R3                                                                                                                                                                                                                                          | 1   |               | Resistor RC series 0603 0.1 W 0 Ω jumper surface<br>mount thick film chip resistor             | RES 0603                   |
| 26 | R4, R6, R8,<br>R11, R12, R13,<br>R19, R20, R23                                                                                                                                                                                              | 9   |               | Resistor thick film 0603 470 Ω 1% 1/4W<br>±100 ppm/C molded SMD SMD paper T/R                  | RES 0603                   |
| 27 | R5                                                                                                                                                                                                                                          | 1   |               | Resistor SMD 10 kΩ 1% 1/4W 0603                                                                | RES 0603                   |
| 28 | R7, R10                                                                                                                                                                                                                                     | 2   |               | Resistor thick film 0603 1 kΩ 1% 0.25W(1/4W)<br>±100 ppm/C epoxy resin pad SMD automotive T/R  | RES 0603                   |
| 29 | R9                                                                                                                                                                                                                                          | 1   |               | Resistor thick film 0603 10 kΩ 1% 1/10W<br>±100 ppm/C molded SMD punched carrier T/R           | RES 0603                   |
| 30 | R14                                                                                                                                                                                                                                         | 1   |               | Resistor thick film 0603 12 kΩ 1% 0.25W(1/4W)<br>±100 ppm/C pad SMD automotive T/R             | RES 0603                   |
| 31 | R15, R16                                                                                                                                                                                                                                    | 2   |               | Resistor thick film 0603 10 Ω 1% 0.25W(1/4W)<br>±100 ppm/C epoxy resin pad SMD automotive T/R  | RES 0603                   |
| 32 | R17                                                                                                                                                                                                                                         | 1   |               | Resistor thick film 0603 15 kΩ 1% 0.25W(1/4W)<br>±100 ppm/C epoxy resin pad SMD automotive T/R | RES 0603                   |
| 33 | R18, R21, R22,<br>R24, R25                                                                                                                                                                                                                  | 5   |               | Resistor thick film 0603 4.7 kΩ 1% 0.25W(1/4W)<br>±100 ppm/C pad SMD automotive T/R            | RES 0603                   |
| 34 | R26                                                                                                                                                                                                                                         | 1   |               | Resistor thick film 0603 2.2 kΩ 1% 0.25W(1/4W)<br>±100 ppm/C pad SMD automotive T/R            | RES 0603                   |
| 35 | SB1, SB2,<br>SB3, SB4,<br>SB5, SB6,<br>SB7, SB8,<br>SB9, SB10,<br>SB11, SB12,<br>SB15, SB16,<br>SB17, SB18,<br>SB19, SB20,<br>SB21, SB22,<br>SB23, SB24,<br>SB26, SB28,<br>SB29, SB30,<br>SB31, SB32,<br>SB33, SB34,<br>SB35, SB36,<br>SB37 | 33  | Closed        | Circuit breaker resistor SMD 0 Ω jumper 1/10W<br>0603                                          | JP2_SMD - CLOSED           |
| 36 | SB13, SB14,<br>SB25, SB27                                                                                                                                                                                                                   | 4   |               | Circuit breaker 0603 – not mounted                                                             | JP2_SMD                    |
| 37 | SW1, SW2                                                                                                                                                                                                                                    | 2   |               | Switch tactile OFF (ON) SPST round button SMD                                                  | TL3301-G                   |
| 38 | TP1, TP5                                                                                                                                                                                                                                    | 2   |               | TPOINTSMD                                                                                      | TPOINTSMD                  |
| 39 | TP2, TP3, TP4                                                                                                                                                                                                                               | 3   |               | TPOINTSMD                                                                                      | TPOINTSMD                  |
| 40 | U1                                                                                                                                                                                                                                          | 1   | STM6315RDW13F | STM6315RDW13F                                                                                  | SOT-143                    |
| 41 | U2                                                                                                                                                                                                                                          | 1   | LD39050PU33R  | Linear regulator 3V3                                                                           | DFN6(3X3)                  |
| 42 | U3                                                                                                                                                                                                                                          | 1   | LD1117S50TR   | IC REG LDO 5V 0.8A SOT223                                                                      | SOT-223                    |
| 43 | U4                                                                                                                                                                                                                                          | 1   |               | FTDI 2232HL                                                                                    | LQFP64                     |
| 44 | U5, U6, U7                                                                                                                                                                                                                                  | 3   |               | Dual-bit dual-supply bus transceiver                                                           | SSOP-8                     |

| #  | Item    | Qty | Value                   | Description                                                                                                       | Footprint                  |
|----|---------|-----|-------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------|
| 45 | U8      | 1   | USBLC6-2P6              | USBLC6 series 2 channel 5.25 V SMT uni-directional $\pm 15$ kV ESD protection-SOT-666                             | SOT666                     |
| 46 | U9, U11 | 2   |                         | Single-bit dual-supply bus transceiver                                                                            | SC-70                      |
| 47 | U10     | 1   |                         | IC REG LDO 3.3V 0.8A SOT223                                                                                       | SOT-223                    |
| 48 | U12     | 1   |                         | 1 KB (x16) serial microwire bus EEPROM with block protection                                                      | SO-8                       |
| 49 | U13     | 1   | SPC58EC80E3             | SPC58EC80E3 - eTQFP100                                                                                            | 100_LQFP_14X14X1.6_EXP-PAD |
| 50 | X1      | 1   | 40 MHz                  | Crystal 40 MHz $\pm 10$ ppm (Tol) $\pm 15$ ppm (stability)<br>8 pF FUND 40 $\Omega$ automotive 4-pin Mini-SMD T/R | QUARZO-SMD-NX2520SA        |
| 51 | X2      | 1   | H130B-12.000-18-3030-TR | CRYSTAL 12.0000 MHz 18 pF SMD                                                                                     | QUARZO-SMD-NX5032          |

## 7

## Schematics

### Figure 20. SPC58ECx MCU



### Figure 21. SPC58ECx connectors

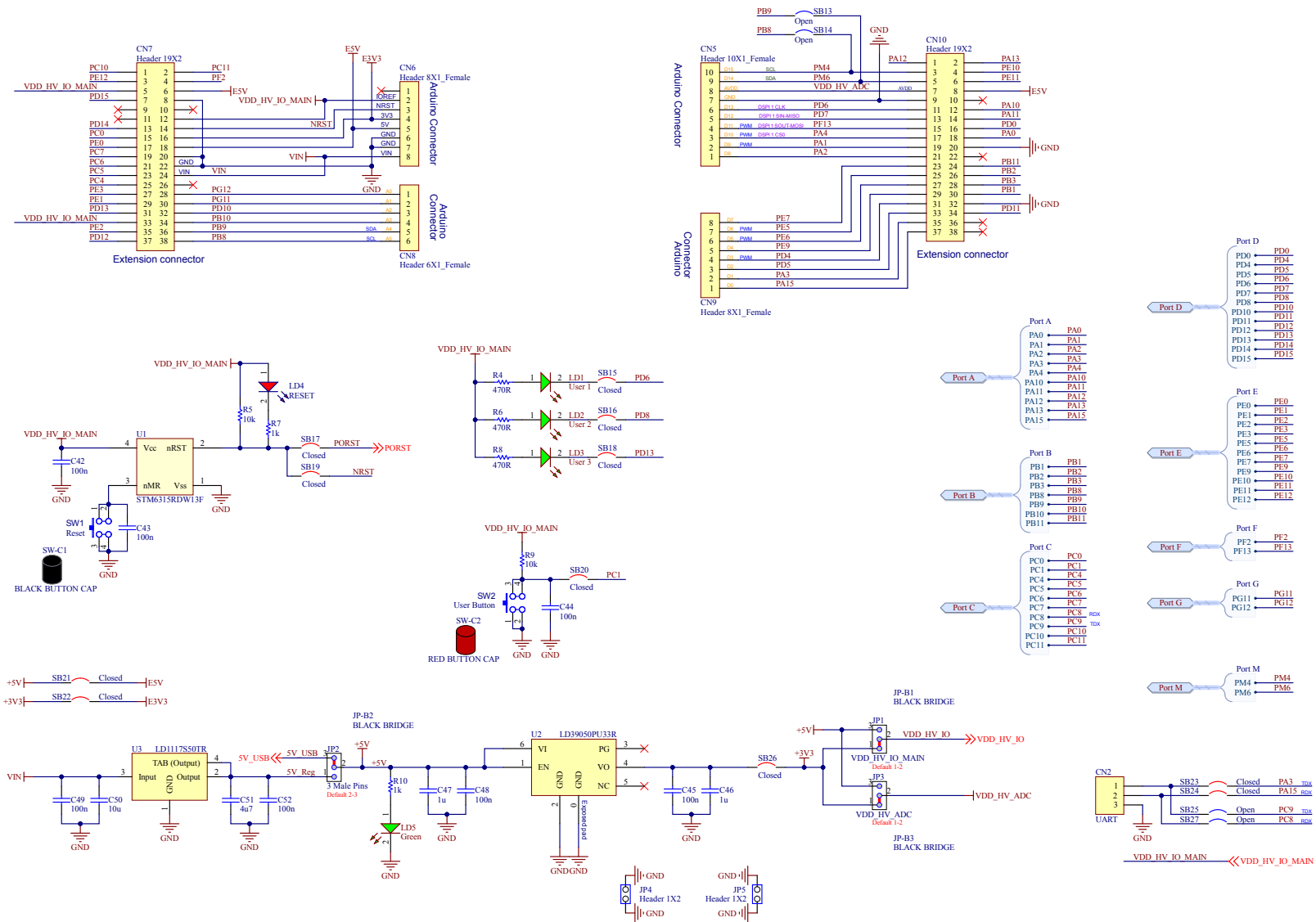
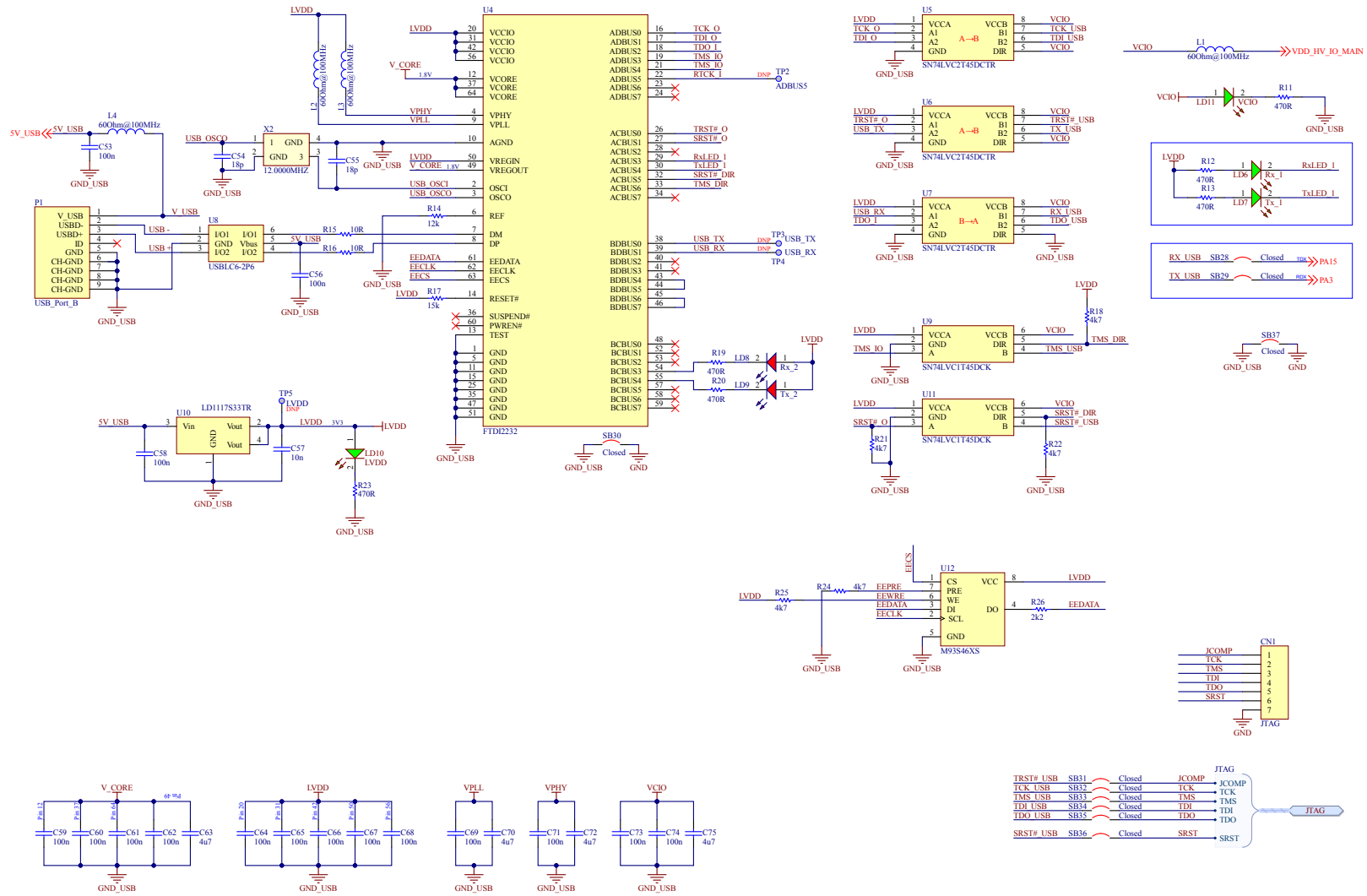


Figure 22. SPC58ECx USB section



## Revision history

**Table 18. Document revision history**

| Date        | Revision | Changes                                                                                                                                                                                                                                                 |
|-------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 22-Nov-2022 | 1        | Initial release.                                                                                                                                                                                                                                        |
| 06-Jun-2023 | 2        | Updated Figure 13. Jumpers configuration of PLS integrated programmer/debugger, Table 11. Arduino UNO-R3 digital PWM (from D7 to D0) (CN9) pinout, Table 15. UART connector pinout, Figure 21. SPC58ECx connectors and Figure 22. SPC58ECx USB section. |

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